PCT WORLD INTELLECTUAL PROPERTY ORGANIZATION
International Bureau

INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 5 : B60R 25/10, G08G 1/127

A1

(11) International Publication Number: WO 94/26567

(43) International Publication Date: 24 November 1994 (24.11.94)

(21) International Application Number: PCT/IT94/00058

(22) International Filing Date: 10 May 1994 (10.05.94)

(30) Priority Data:
BO93A000208 11 May 1993 (11.05.93) IT

(71) Applicant *(for all designated States except US)*: ELEMENTARE WATSON S.R.L. [IT/IT]; Via Verdi, 6, I-50013 Campi Bisenzio (IT).

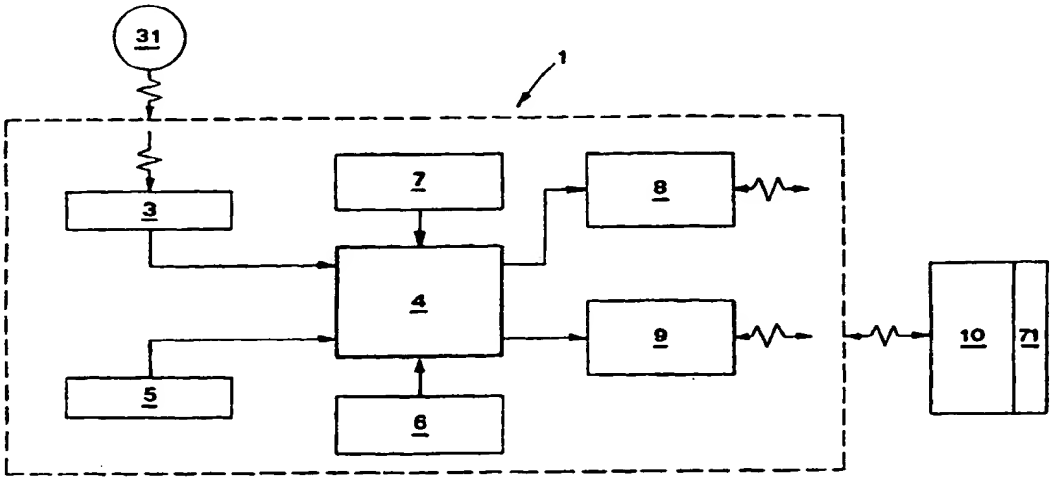
(72) Inventor; and
(75) Inventor/Applicant *(for US only)*: COLIZZA, Michele [IT/IT]; Via Aurelia Orientale, 269, I-16030 Zoagli (IT).

(74) Agent: DALL'OLIO, Giancarlo; Invention S.n.c., Via del Cestello, 13, I-40124 Bologna (IT).

(81) Designated States: AU, CA, JP, US, European patent (AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE).

Published
With international search report.

(54) Title: ANTITHEFT SYSTEM INTEGRATED WITH FUNCTIONS OF SECURITY, INFORMATION AND NAVIGATION, BASED ON ELECTRONIC CARTOGRAPHY, VOCAL SYNTHESIS AND RADIO TELECOMMUNICATION



(57) Abstract

The antitheft system (1), installed on a motor vehicle (2), comprises an electronic control unit (4) capable to control a localisation information detector (3), a telephone apparatus (8), a transmitter-receiver radio (9), a plurality of sensor equipped devices (5) designed to detect certain conditions, a data base with electronic cartography (6) and a data base for production of synthesized voices (7). The antitheft system (1) can recognise anomalous conditions of a motor vehicle (2), produce a correspondent talked words message and then transmit it directly to the public supervision and security organisations by means of a telephone apparatus (8) and, transmit it also to a person authorised to use the motor vehicle (2) by means of transmitter-receiver radio (9) and a portable transceiver radio (10).

FOR THE PURPOSES OF INFORMATION ONLY

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AT	Austria	**GB**	United Kingdom	**MR**	Mauritania
AU	Australia	**GE**	Georgia	**MW**	Malawi
BB	Barbados	**GN**	Guinea	**NE**	Niger
BE	Belgium	**GR**	Greece	**NL**	Netherlands
BF	Burkina Faso	**HU**	Hungary	**NO**	Norway
BG	Bulgaria	**IE**	Ireland	**NZ**	New Zealand
BJ	Benin	**IT**	Italy	**PL**	Poland
BR	Brazil	**JP**	Japan	**PT**	Portugal
BY	Belarus	**KE**	Kenya	**RO**	Romania
CA	Canada	**KG**	Kyrgystan	**RU**	Russian Federation
CF	Central African Republic	**KP**	Democratic People's Republic of Korea	**SD**	Sudan
CG	Congo			**SE**	Sweden
CH	Switzerland	**KR**	Republic of Korea	**SI**	Slovenia
CI	Côte d'Ivoire	**KZ**	Kazakhstan	**SK**	Slovakia
CM	Cameroon	**LI**	Liechtenstein	**SN**	Senegal
CN	China	**LK**	Sri Lanka	**TD**	Chad
CS	Czechoslovakia	**LU**	Luxembourg	**TG**	Togo
CZ	Czech Republic	**LV**	Latvia	**TJ**	Tajikistan
DE	Germany	**MC**	Monaco	**TT**	Trinidad and Tobago
DK	Denmark	**MD**	Republic of Moldova	**UA**	Ukraine
ES	Spain	**MG**	Madagascar	**US**	United States of America
FI	Finland	**ML**	Mali	**UZ**	Uzbekistan
FR	France	**MN**	Mongolia	**VN**	Viet Nam
GA	Gabon				

ANTITHEFT SYSTEM INTEGRATED WITH FUNCTIONS OF SECURITY, INFORMATION AND NAVIGATION, BASED ON ELECTRONIC CARTOGRAPHY, VOCAL SYNTHESIS AND RADIO TELECOMMUNICATION

TECHNICAL FIELD

The present invention is related to the technical field concerning automatic supervision and security devices, that can be attached to transport means in general and to motor vehicles in particular.

More precisely, the present invention is concerned with a motor vehicle antitheft system integrated with functions of security, localisation and navigation of the same motor vehicle.

BACKGROUND ART

Nowadays, there are many types of antitheft systems for motor vehicles, but generally they can be subdivided in two categories: the antitheft systems acting in a limited range and the antitheft systems acting in a wider range.

The first group includes antitheft systems which signal automatically tampering or anomalous use of the motor vehicle in a limited environment surrounding the same motor vehicle.

In other words, these antitheft systems, attached to motor vehicles, signal either acoustically or visually fraudulent use of motor vehicles by persons considered "unauthorised", because they have not deactivated the same antitheft system.

The main disadvantage of this type of antitheft systems results just from their peculiar characteristic, i.e. their limited range of action, of dozens or hundreds metres, either for signalling

the tampering into the vehicle or the activation or deactivation of the same antitheft system.

Another disadvantage of this type of anti-theft systems is that, in order to function, they must be first activated by an "authorised" person.

The other group of antitheft system comprises the antitheft system for motor vehicle that signal "unauthorised" tampering of the motor vehicle up to a distance of some kilometres from the same motor vehicle.

Such antitheft system are provided with a transmitter-receiver unit on radio frequency that can produce and transmit an alarm signal that can be received and recognised by an operative station, on the same radio frequency and designed to distant monitoring of possible thefts of the load stored in the motor vehicle or its part, or theft of the same motor vehicle.

Such alarm signal is transmitted by the antitheft system set up on the vehicle only if preestablished conditions for recognising the theft occur.

The most common conditions that activate the antitheft system for motor vehicle are first of all subjected to the previous voluntary activation by the motor vehicle driver's by means of a special key either mechanical or electronic (remote control key, magnetic card, and the like).

Most often the antitheft system is activated when one of the motor vehicle doors is opened or when the same motor vehicle is started.

The biggest disadvantage of this type of antitheft system derives from its limited some kilometre dozens action range, therefore the motor vehicle can be monitored only in the city area or

anyway, in a limited zone of national territory.

Further disadvantage of this type of anti-theft system results from the necessity to prepare a stationary check room that is able to talk to the mobile unit of the antitheft system installed on the motor vehicle.

The management cost of such a stationary check room is high what, added to the initial cost and the management cost of this type of antitheft system, makes it extremely expensive.

Another disadvantage of "zone" covering antitheft systems of this type derives from the fact that they can be easily dodged, since the "authorised" person could be forced by an ill-intentioned person to deactivate the antitheft system by inserting the proper mechanical or electronic key.

Still further inconvenience of both the above presented types of antitheft system lies in activation and deactivation of the antitheft system.

In fact, such an action must be always performed by a person authorised to use the motor vehicle who, moreover, must be always very near the same or, at most, some kilometres from the motor vehicle, for limited range antitheft systems and those wider range antitheft systems, respectively.

DISCLOSURE OF THE INVENTION

The main scope of the present invention is to provide an antitheft system for motor vehicles that recognises, independently or through a distant polling, the conditions determining the theft and that is capable to produce and transmit the alarm signal.

Further object of the present invention is to provide an antitheft system capable to signal alarm

either near the motor vehicle or within the range of some kilometres, or also in such a range that the antitheft system signal can be caught over the whole national territory.

Another important object of the invention is to provide an antitheft system capable to signal alarm to the public security organisations, therefore avoiding a stationary station dedicated thereto and on work the whole day long.

Still further object of the present invention is to provide an antitheft system integrated with security functions either for the driver or for the same motor vehicle.

Next object of the present invention is to provide an "intelligent" antitheft system capable to issue, when requested, general and navigation information either to the driver or to a possible stationary check station.

The above stated objects are obtained with an antitheft system that is integrated with functions of security, information and navigation based on electronic cartography, vocal synthesis and radio telecommunication, this system being partially placed in a box-shaped casing 12 and fastened to a motor vehicle 2.

The antitheft system according to the invention comprises the following means:

- a localisation information detector provided with at least a first antenna;
- a telephone apparatus provided with at least a second antenna;
- a plurality of sensor equipped devices, subdivided in a first group of sensors, which are external to the said box-shaped casing, and a second group of sensors which are internal to the same box-shaped

casing, these sensor equipped devices having the task of detecting determined conditions;
- a series of mass memory units;
- an electronic unit, connected functionally to said means, for controlling the latter as well as for controlling signals respectively received and sent;
- an independent power feeding section for feeding the electronic unit and said means.

BRIEF DESCRIPTION OF THE DRAWINGS

The characteristics of the present invention are pointed out in the following, with reference to the enclosed drawings, in which:
- figure 1 schematically represents, by means of a block diagram, of the operation of the antitheft system being the subject of the present invention;
- figure 2 is a schematic view showing the dislocation of sensor means equipped devices of the antitheft system, in a motor vehicle;
- figure 3 shows a cross section of the principal component of the antitheft system;
- figure 4 shows a diagram representing functional connections between the different means forming the antitheft system.

BEST MODES OF CARRYING OUT THE INVENTION

With reference to figure 1, the reference number 1 indicates an antitheft system integrated with functions of security, information and navigation, and based on electronic cartography, vocal synthesis and radio telecommunication.

The system 1, partially housed in a box shaped casing 12, can be fastened to a motor vehicle 2, such as the lorry 2 shown in the figure 2 and provided with a driver cab 35 and a container body

33.

With reference to figures 1, 3 and 4, the system 1 basically consists of a localisation information detector, a telephone apparatus 8, a transmitter-receiver radio 9, a plurality of sensor means equipped devices 5, subdivided in a first group of sensors, which are external in respect to the mentioned box-shaped casing 12, and in a second group 5b of sensors internal in respect to the same box-shaped casing 12, an independent feeding section 13 and an electronic unit 4 for control and management of all the above mentioned devices and respective received and transmitted signals.

The localisation information detector 3, commonly known as G.P.S. device, comprises a mechanism provided with a related first antenna 3a that receives information transmitted by more satellites 31.

This mechanism can also process and standardise the received information making them available on a serial line, in NMEA code.

The information codified in this way concern the terrestrial physical units relative to the position of the same G.P.S. device on the terraqueous globe, and in particular, they refer to the longitude, the latitude, the temperature, the pressure, the date, the hour, the speed and the course.

The telephone apparatus 8, provided with a related second antenna 8a, is composed of a cellular telephone, whose carrier is on the 900 MHz frequency and whose power is within some Watt.

The transmitter-receiver radio 9, provided with a related third antenna 9a, uses a transceiving carrier included in V.H.F. wave range that varies from 27 to 30 MHz and whose power varies from 30 to

300 mWatt.

The first series of external sensors 5a, shown in the figure 2, includes a touch sensor 51, a weight sensor 52, an antenna sensor 53, a load monitoring circuit 55, at least one door opening-closing sensor 56, a volume monitoring circuit 57, an authorised presence checking circuit 58, and by a moving detecting circuit 59.

The touch sensor 51 is capable of detecting the touching of the motor vehicle 2 by at least one person.

Such a sensor is particularly sensible if attached to a motor vehicle 2 whose driving cab 35 and body 33 are made of metal.

The weight sensor 52 is usually applied to the seat 34 of the motor vehicle 2 and is able to detect the driver's weight difference, with some kilograms tolerance.

The antenna sensor 53 can detect various types of intentionally provoked breakdown of the antennas, first 3a, second 8a and third 9a, respectively, such as cutting of the cables connecting said antennas with relative devices, short circuit and the like.

The load monitoring circuit 55, by means of at least one load cell situated on the relative load platform 36 of the motor vehicle 2, can detect the load weight differences on the same load platform.

The door opening-closing sensor 56, usually situated in correspondence with hinge points between a door 32 of the motor vehicle and the relative doorpost, can detect the situation in which the relative door 32 is closed and/or opened.

The volume monitoring circuit 57, placed inside the container body 33, can detect the volume

changes of the load inside the same body, by means of the constant monitoring of the load set-up.

The authorised presence checking circuit 58, positioned inside the driving cab, can inform the system 1 that an authorised person uses the motor vehicle 2.

This is made possible because the circuit 58 reads a code, given to the circuit 58 by the same authorised person by means of an electronic key, e.g. a magnetic card.

Information concerning not only the authorisation code, but e.g. also anagraphic data of the person authorised to use the motor vehicle 2, technical-physical characteristics of the same motor vehicle, fundamental trip data such as the places met on the route, the trip length and planned stops, have been previously recorded on such magnetic card.

The moving detecting circuit 59, that is functionally connected to the touch sensor 51, to the weight sensor 52 and to the localisation information detector 3, compares the information received from the devices connected thereto in order to continuously check whether the motor vehicle 2 is moved in a regular authorised way.

The second group of internal sensors 5b, shown in figure 3, includes a temperature sensor 61, an overturning sensor 62 and a push sensor 63.

The temperature sensor 61 is designed to detect abnormal temperature changes, provoked e.g. by a fire broken out in motor vehicle 2.

The overturning sensor 62 of the system 1 is designed to detect an abnormal position either of the box shaped casing 12 or of the motor vehicle 2.

The push sensor 63 of the system 1 is designed to detect the intensity of pushes received

either by the box shaped casing 12 or by the related motor vehicle 2.

With reference to figures 1 and 4, the group of memory units 6 and 7 is constituted by a first memory unit 6 and a second memory unit 7.

The first memory unit 6 is designed to register the data base for electronic cartography.

For example, such a data base contains territorial information concerning places, ways, motorways, crossings, tunnels, bridges, railways, harbours and airports.

The second memory unit 7 has recorded thereon a data base for the production of synthetized voices.

Such a data base contains information related to vocal synthesis of words and phrases concerning mainly the readings of the information contained in the first memory unit 6 for the electronic cartography.

As shown in the figure 4, the electronic unit 4 consists of: an amplifier/regenerator 16 for amplifying and regenerating the information received from the above mentioned localisation information detector 3, a shift memory unit 18 for recording the last information received from the said detector 3, a comparator 19 for comparing two subsequent pieces of information received from the detector 3 by means of the memory unit 18, and a central processor 20.

By carrying out a series of preestablished instructions, such processor 20 can interpret and process the information received from the comparator 19, the conditions detected by external and internal sensor equipped devices, respectively 5a and 5b, as well as the data recorded in the first memory unit 6

and the second memory unit 7.

By interposition of the input modem 22 and decoder 23, the central processor 20 can also control the calls received either from the cellular telephone 8 or the transmitter-receiver radio 9.

A first timer 28 is also connected to the central processor.

By means of the timer, the central processor 20, on the basis of the data processed by it, can decide and activate either indirectly, through a decoder 25 and an output modem 24, or directly a calls control circuit 21 connected to both the telephone apparatus 8 and the transmitter-receiver radio 9.

It is to be pointed out that the modems 22, 24, the encoder 25 and the decoder 25 are integral parts of the electronic unit 4.

The electronic unit 4 comprises also:

a proper operation check circuit 26 for the central processor 20;

a switch circuit 27, placed between the comparator 19 and the output modem 24, that can connect directly the comparator 19 and the output modem 24 upon the consent received from the check circuit 26;

a second timer 17 connected to the calls control circuit 21;

a first socket 29 for input and output of a series of pre-established instructions and data destined to both the central processor 20 and the first and second memory units 6, 7, respectively;

a second socket for input of information related to the central processor 20 activation and for the output of information related to the state of the said system 1.

The independent feeding section 13, connected

to the electric feeding system (not shown) of the motor vehicle 2, includes a group of rechargeable, suitably dimensioned, batteries that can assure the system 1 independent operation for about six days in case of disconnection of the feeding section 13 from the same motor vehicle electric feeding.

With reference to figures 1 and 2, the system 1 is also provided with a portable transceiver radio 10 that can communicate radio-telephonically with the transmitter-receiver radio 9.

Such portable transceiver radio is also provided with a digital unit 71 that can exchange bidirectionally information with the central processor 20 when the portable transceiver radio 10 is inserted in a special seat 70 (external sensor 5a) made in the driving cab 35.

In such a position, the digital unit 71 records automatically the information related to the date, hour, last three positions detected by the localisation information detector 3 and to the state of all the sensor equipped devices.

With reference to figure 2, externally to the box-shaped casing 12, the system 1 has also:

a fourth antenna 3b connected to the G.P.S. device;

a fifth antenna 8b connected to the cellular telephone 8;

a sixth antenna 9b connected to transmitter-receiver radio 9;

an antenna switching circuit 54 designed to continuously switch respectively, from the first antenna 3a to the fourth antenna 3b of the G.P.S. device, from the second antenna 8a to the fifth antenna 8b of the cellular telephone 8 and from the third antenna 9a to the sixth antenna 9b of the transmitter-receiver radio 9.

It is to be pointed out that the antenna sensor 53 detects also possible intentional break down of the said first 3a, second 8a, third 9a, fourth 3b, fifth 8b and sixth 9b antennas.

Still with reference to figure 2, the system 1 is also provided with a display means 80 (external sensor 5a), that is situated in the driving cab 35 and connected with the central processor 20, and that can display the main information processed by the central processor 20, such as the current date and hour, the speed of the motor vehicle, the present localisation, the last registered localisation data and the future positions, the expected arrival time, the information detected by the localisation information detector 3 during the last hours, and the state of all the sensor equipped devices 5. Such a display means 80 has also an acoustic device.

With reference to figure 3, a strengthening and protection structure 14 having an opening 15 in correspondence with the antenna 3a of the G.P.S. device, is attached to the internal walls of the box-shaped casing 12 of the system 1.

In embodiment, as illustrated in figures 3 and 4, the system 1 provides a second transmitter-receiver radio 11, equipped with at least one seventh antenna 11a, said transmitter-receiver radio 11 being connected to the calls control circuit 21 and designed to exchange bidirectionally the information with the central processor 20, by interposition of the input modem 22 and the decoder 23, and of the output 24 and the coder 25.

Said second transmitter-receiver radio 11 uses a transceiving carrier included in the U.H.F. wave-range at about 400 MHz.

In this embodiment the antenna 53 sensor can

detect possible voluntary breakdown also of the seventh antenna 11a.

Moreover, the system 1 provides an eighth antenna 11b connected with the second transmitter-receiver radio 11.

Similarly to what has been already said, the switch circuit of the antenna 54 provides also for the continuous switching from the seventh antenna 11a to the eighth antenna 11b.

The antenna sensor 53 is also designed to detect possible voluntary breakdown of the last eighth antenna 11b.

A further embodiment provides the use of a second weight sensor 52b that can detect the motor vehicle 2 weight.

When the motor vehicle is motionless and there is no wind, the sensor 52b detects also the same motor vehicle weight with a tolerance of 35 kilogramme.

In another embodiment the system 1 provides at least one stationary control station, not illustrated in any figure, that can exchange the information with either the cellular telephone 8, or with the first V.H.F transmitter-receiver radio 9, or with the second U.H.F. transmitter-receiver radio 11.

Figure 4 refers substantially the working of the system 1. Figure 4 shows the central processor 20 that is activated by a person authorised to use the motor vehicle, by means of reading a magnetic card, through the authorised presence check circuit 58 whose data are memorised in a non volatile memory unit (not shown) inside the central processor 20.

At that moment the system 1 is put into operation.

The G.P.S. device 3 begins to receive from the satellites 31 the localisation information that, amplified and/or regenerated by the amplifying/regenerating device 16, are interpreted and made sequentially available, in standardised NMEA code, to the memory unit 18 and to the comparator 19.

The comparator 19 filters the identical localisation information and sends to the central processor 20 only the different localisation information issued by the G.P.S device.

The central processor 20 begins to compare the values received from the sensor equipped devices 5 with the relative reference threshold values in order to establish possible alarm situations.

The central processor 20, carrying out its series of predetermined information, can start the alarm procedure when the precise combinations of alarm situations are determined.

On that point, the central processor 20, on the basis of the localisation information received from the G.P.S. device, can read from the memory unit 6, that contains the electronic territorial cartography, the route of the motor vehicle 2 with about 30 metres approximation.

The central processor 20, by reading its not volatile memory unit and the memory unit 7 of synthetized voices, can therefore form a talked word message containing basic information related to the motor vehicle 2 and the route it is covering.

The central processor 20, while keeping on carrying out its preestablished commands, can choose the telephone number of the Public Security Authorities and/or Assistance, on the basis of the predetermined priorities (e.g. if the motor vehicle is

going on a motorway, the sequence, in the decreasing order, of the telephone numbers will be as follows: Motorway (Traffic) Police, Motorway Company Direct Line, Automobile Association Assistance, Carabinieri, and stationary operative station, if the latter is provided).

In this phase, the central processor 20 can activate the calls control circuit 21 and the cellular telephone 8, and can also call, with cadences established by the first timer 28, the chosen telephone number and transmit a talked word message.

At the same time and in the way identical to the activation of the cellular telephone 8, the central processor 20 provides also for sending the word message also through the V.H.F. transmitter-receiver radio 9.

The message is received, in the range of some kilometres, by the portable V.H.F. transceiver radio (not shown) placed in a stationary operative station.

As results from the type of sensor equipped devices 5 as well as from the variety of telephone numbers correspondent to the Public Authorities, it is obvious that the talked word message is automatically formed by the central processor 20 according to the its destination.

There are provided the informative messages concerning navigation data or the security data and the alarm messages of the following types: alarm for the theft of the motor vehicle 2, alarm for the accident of the motor vehicle 2, alarm for voluntary breakdown of the system 1, and the like.

When the alarm situation occurs, the system 1 is also able to decide independently, on the basis of the alarm type, the activation of the light and

acoustic devices of the motor vehicle 2, or the devices (not shown) that can deactivate any leaving or movement of the same motor vehicle.

The latter devices comprise devices designed to stop the fuel delivery to the motor vehicle engine or devices activating the means stopping the same motor vehicle.

Information, adequately chosen and filtered, detected and processed by the central processor 20, are displayed by the display means 80 and are recorded on the digital unit 70 of the portable transceiver radio 10.

The key (identifying code) for the system 1 activation can be changed in any moment during operation of the system 1 by reception of a new key, in coded form, via the cellular telephone 8 and/or via the V.H.F. transmitter-receiver radio 9.

In fact, the codified key is read by the central processor 20 through the input modem 22 and the decoder 24.

When the central processor does not work perfectly, the decoder 23 sends automatically the decoded key to the calls control circuit 21.

Also the activation key is changeable by suitable devices that con be connected to the second socket 30 of the electronic unit 4.

In such a case the central processor 20 can transmit the codified activation key using the codifier 25, the output modem 24, the calls control circuit 21 and the cellular telephone 8 and/or the transmitter-receiver radio 9.

It is possible to exchange bidirectionally all types of data with the central processor 20 by the input 22 and output 24 modems.

It is possible to exchange e.g. the data

related to the route the motor vehicle 2 must follow, data related to the information sequences performable by the same central processor 20, data related both to the data base of electronic cartography and data base of synthetized voices and data related to the navigation during the last hour stored by the central processor 20.

It is also possible to exchange bidirectionally the above mentioned data with special devices (not shown) and the central processor 20 through the first socket 29 and the second socket 30, respectively, with which the system 1 is provided.

In case of irregular operation of the central processor 20, detected by the good operation check circuit 26 for the same central processor 20, the system 1, by means of the switch circuit 27 intervention, can send, by the output modem 24, the information received and standardised by the G.P.S. device 3 and, directly, the states of the sensor equipped devices 5.

These data are sent to the calls control circuit 21 that provides, through to the second timer 17, for dialling a prefixed number with the circuit 8 and for transmitting a coded message through the circuit 8 and the V.H.F transmitter-receiver radio 9.

In the embodiment providing the second U.H.F. transmitter-receiver radio 11, the operative procedure of the whole system 1 is substantially the same, while the action range and the system 1 flexibility increase considerably.

In fact, by means of such a second transmitter-receiving radio 11, the system 1 can talk with a stationary operative station in the range of dozens of kilometres.

INDUSTRIAL APPLICABILITY

The industrial applicability of the claimed invention results well clear both from the need that today exists for antitheft systems, which must be reliable and effective, and from the advantages that the present invention brings about.

The main advantage of the present invention lies in providing an antitheft system for motor vehicle that is able to recognise independently abnormal conditions of the motor vehicle, and that accordingly produce a correspondent talked word message and, therefore, transmit it by a telephone apparatus and/or by a radio-frequency transmitter-receiver radio.

Another advantage of the present invention is that it provides an antitheft system capable of sending the message near the motor vehicle or in the range of some kilometres as well as for the bigger distances so as to be picked up in the whole national territory.

Further important advantage of the present invention is that it provides an antitheft system that is capable to transmit talked word messages to the public security organisations, therefore avoiding a stationary station dedicated thereto and on work the whole day long.

Still further advantage of the present invention lies in the fact that it provides an antitheft system integrated with security functions either for the driver or for the same motor vehicle due to the antitheft system possibility to furnish, when requested or continuously, general and navigation information either to the driver or to a possible stationary check station.

From all what above it appears that this

antitheft system is destined to encounter great favour and to be produced on industrial basis.

Moreover the subject invention has been described, with reference to the enclosed drawings, only as a mere example, not limitative, therefore it is obvious that all the modifications o variants suggested either by practice or the activation and usage thereof are anyway within the following claims.

CLAIMS

1. Antitheft system integrated with functions of security, information and navigation based on electronic cartography, vocal synthesis and radio telecommunication, with said system (1) partially placed in a box-shaped casing (12) and fastened to a motor vehicle (2) characterised in that it comprises the following means:

- a localisation information detector (3) provided with at least a first antenna (3a);
- a telephone apparatus (8) provided with at least a second antenna (8a);
- a plurality of sensor equipped devices (5), subdivided in a first group (5a) of sensors external to the said box-shaped casing (12), and in a second group of sensors internal to the same box-shaped casing (12), with said sensor equipped devices (5) destined to detect determined conditions;
- a series of mass memory units (6,7);
- an electronic unit (4), connected functionally to said means, for controlling the latter as well as signals respectively received and sent;
- an independent feeding section (13) for feeding the electronic unit (4) and said means.

2. Antitheft system integrated with functions of security, information and navigation based on electronic cartography, vocal synthesis and radio telecommunication, with said system (1) partially placed in a box-shaped casing (12) and fastened to a motor vehicle (2), characterised in that it comprises the following means:

- a localisation information detector (3) provided with at least a first antenna (3a);
- a telephone apparatus (8) provided with at least a

second antenna (8a);
- a transmitter-receiver radio (9) provided with at least a third antenna (9a);
- a plurality of sensor equipped devices (5), subdivided in a first group (5a) of sensors external to the said box-shaped casing (12), and in a second group of sensors internal to the same box-shaped casing (12), with said sensor equipped devices (5) having the task of detecting determined conditions;
- a series of mass memory (6,7);
- an electronic unit (4), connected functionally to said means, for controlling the latter as well as signals respectively received and sent by them;
- an independent feeding section (13) for feeding the electronic unit (4) and said means.

3. Antithedt system, according to claim 1 or claim 2 characterised in that the said electronic control unit (4) comprises:
- an amplifier/regenerator (16) for amplifying or regenerating information received from the said localisation information detector (3);
- a memory (18) for recording the information received from the said detector (3);
- a comparator (19) for the comparison of two consecutive pieces of information received from the said detector (3) through the said memory (18);
- a central processor (20) that, by performing a series of preestablished commands, is able to interpret and process the information received from the said comparator (19), the states detected by said external and internal sensor equipped devices (5a,5b), data recorded in the said series of mass memory units (6,7) as well as the calls received, through interposition of an input modem (22) and a decoder (23), from the said telephone apparatus (8)

and from the said transmitter-receiver radio (9), with said central processor (20) capable also, on the basis of interpreted data and by means of a first call timer (28), of deciding and activating either indirectly, by a decoder (25) and an output modem (24), or directly, a calls control circuit (21), connected to both the said telephone apparatus (8) and the said transmitter-receiving radio (9);

- a proper operation check circuit (26) for the said central processor (20);

- a switching circuit (27) placed between the said comparator (19) and the said modem (24) and connected to the said check circuit (26);

- a second timer (17) connected to the said control circuit (21).

4. Antitheft system, according to claim 3, characterised in that said second electronic control unit (4) comprises also:

- a first socket (29) for the input and output of a series of preestablished commands and of data addressed to the said central processor (20) and to the said memory units (6,7);

- a second socket (30) for the input of information related to the activation of the said central processor (20) and for the output of the information related to the state of the said system (1).

5. Antitheft system, according to claim 1 or claim 2, characterised in that said localisation information detector (3) includes a device adapted to receive the information from at least one satellite (31) and to process this information concerning basically physical terrestrial magnitudes related to the position on the terraqueous globe of the said localisation information detector (3), with said information related to the longitude, the latitude,

the temperature, the pressure, the date, the time, the speed and the route.

6. Antitheft system, according to claim 1 or claim 2, characterised in that said first group of external sensors (5a), connected with the said electronic unit (4), is formed by at least a touch sensor (51) sensitive to touching the said motor vehicle (2).

7. Antitheft system, according to claim 1 or claim 2, characterised in that said first group of external sensors (5a), connected with the said electronic unit (4), is formed by a weight sensor (52) adapted to detect the weight change of a driver on the seat (34) of the said motor vehicle (2).

8. Antitheft system, according to claim 1 or claim 2, characterised in that said first group of external sensors (5a), connected with the said electronic unit (4), is formed by an antenna sensor (53) adapted to detect possible voluntary breakdown of the said first, second, and third antennas, (3a,8a,9a) respectively.

9. Antitheft system, according to claim 1 or claim 2, characterised in that said first group of external sensors (5a), connected with the said electronic unit (4), is formed by at least one load monitoring circuit (55), adapted to detect the changes of the weight of a load into the container body (33) of the said motor vehicle (2).

10. Antitheft system, according to claim 1 or claim 2, characterised in that said first group of external sensors (5a), connected with the said electronic unit (4), is formed by at least one door opening-closing sensor (56) adapted to recognise when a related door (32) of the said motor vehicle (2) is opened or closed.

11. Antitheft system, according to claim 1 or claim

2, characterised in that said first group of external sensors (5a), connected with the said electronic unit (4), is formed by a volume monitoring circuit (57) fit to detect the changes of volume of a load inside to the container body (33).

12. Antitheft system, according to claim 1 or claim 2, characterised in that said first group of external sensors (5a), connected with the said electronic unit (4), is formed by a circuit (58) checking the authorised presence and adapted to recognise, by a code, the presence of a person authorised to the use of the said motor vehicle (2).

13. Antitheft system, according to claim 1 or claim 2, characterised in that said first group of external sensors (5a), connected with the said electronic unit (4), is formed by:

- at least one touch sensor (51) sensitive to the said motor vehicle (2) being touched;
- a weight sensor (52) adapted to detect the weight changes of a driver on a seat (34) of the said motor vehicle (2);
- a moving detecting circuit (59) capable of detecting the abnormal movement of the said motor vehicle (2) by comparing the signals detected by the said touch sensor (51), the said weight sensor (52) and the said localisation information detector (3).

14. Antitheft system, according to claim 1 or claim 2, characterised in that said first group of external sensors (5a), connected with the said electronic unit (4,) includes:

- at least one touch sensor (51) sensitive to the said motor vehicle (2) being touched;
- a weight sensor (52) adapted to detect the weight changes of a driver on a seat (34) of the said motor vehicle (2);

- an antenna sensor (53) adapted to detect possible voluntary breakdown of the said first, second and third antennas, (3a,8a,9a) respectively;
- at least one load monitoring circuit (55), adapted to detect the changes of weight of a load inside the container body (33) of the said motor vehicle (2);
- at least one door opening-closing sensor (56) adapted to recognise when a related door (32) of the said motor vehicle (2) is opened or closed;
- by a volume monitoring circuit (57) fit to detect the changes of volume of the load inside the container body (33);
- a check circuit (58) for checking the authorised presence and adapted to recognise, by a code, the presence of a person authorised use the said motor vehicle (2);
- a moving detecting circuit (59) capable of detecting the abnormal movement of the said motor vehicle (2) by comparing the signals detected by the said touch sensor (51), the said weight sensor (52) and the said localisation information detector (3).

15. Antitheft system, according to claim 1 or claim 2, characterised in that said second group of internal sensors (5b), connected to the said electronic unit (4), comprises a temperature sensor (61).

16. Antitheft system, according to claim 1 or claim 2, characterised in that said second group of internal sensors (5b), connected to the said electronic unit (4), comprises a turn over sensor (62) sensitive to the said box-shaped casing (12) and the said motor vehicle (2) being overturned

17. Antitheft system, according to claim 1 or claim 2, characterised in that said second group of internal sensors (5b), connected to the said electronic unit (4), comprises a push sensor sensitive to

the said box-shaped casing (12) and the said motor vehicle (2) being pushed.

18. Antitheft system, according to claim 1 or claim 2, characterised in that said second group of internal sensors (5b), connected to the said electronic unit (4), comprises:

- a temperature sensor (61);
- a turn over sensor (62) for the said box-shaped casing (12) and the said motor vehicle (2).
- a push sensor for the said box-shaped casing (12) and for the said motor vehicle (2).

19. Antitheft system, according to claim 1 or claim 2, characterised in that said mass memory units (6,7) comprises a first memory unit (6) in which a data base for electronic cartography is stored.

20. Antitheft system, according to claim 1 or claim 2, characterised in that said mass memory units (6,7) comprises a second memory unit (7) in which a data base of synthetized voices is stored.

21. Antitheft system, according to claim 1 or claim 2, characterised in that said telephone device (8) includes a portable cellular telephone.

22. Antitheft system, according to claim 1 or claim 2, characterised in that said transmitter-receiver radio (9) is a V.H.F. transmitter-receiver radio.

23. Antitheft system, according to claim 1 or claim 2, characterised in that it comprises also a portable transceiver radio (10) capable of exchanging information with the said transmitter-receiver radio (9).

24. Antitheft system, according to claim 23, characterised in that said portable transceiver radio (10) is provided with a digital unit (71) capable of exchanging bidirectionally information with the said electronic unit (4), when the said portable transc-

eiver radio (10) is inserted in a special seat (70) in the driving cab (35) of the said motor vehicle (2).

25. Antitheft system, according to claim 23, characterised in that said portable transceiver radio (10) is a V.H.F. transceiver radio.

26. Antitheft system, according to claim 1 or claim 2, characterised in that it comprises also:

- a fourth antenna (3b) connected to the said localisation information detector (3);
- a fifth antenna (8b) connected with the said telephone apparatus (8);
- a sixth antenna (9b) connected to the said transmitter-receiver radio (9);
- a switching antenna circuit (54) adapted to switch continuously from the said first antenna (3a) to the said fourth antenna (3b), from the said second antenna (8a) to the said fifth antenna (8b) and from the said third antenna (9a) to the said sixth antenna (9b).

27. Antitheft system, according to claim 26, characterised in that it comprises also an antenna sensor (53) adapted to detect possible voluntary breakdown of the said first, second, third, fourth, fifth and sixth antennas (3a,8a,9a,3b,8b,9b) respectively.

28. Antitheft system, according to claim 1 or claim 2, characterised in that it comprises also a second transmitter-receiver radio (11), provided with at least one seventh antenna (11a), connected with the said calls control circuit (21) and fit to exchange bidirectionally information with the central processor (20), by interposition of the said input modem (22) and said decoder (23), and of said output modem (24) and said coder (25).

29. Antitheft system, according to claim 28, charac-

terised in that said second transmitter-receiver radio (11) is an U.H.F. transmitter-receiver radio.

30. Antitheft system, according to claim 1 or claim 2, characterised in that said first group of external sensors (5a), connected with the said electronic unit (4), is formed by an antenna sensor (53) fit to detect possible voluntary breakdown of the said antennas, first (3a), second (8a), third (9a), and seventh (11a).

31. Antitheft system, according to claim 28, characterised in that it comprises also:

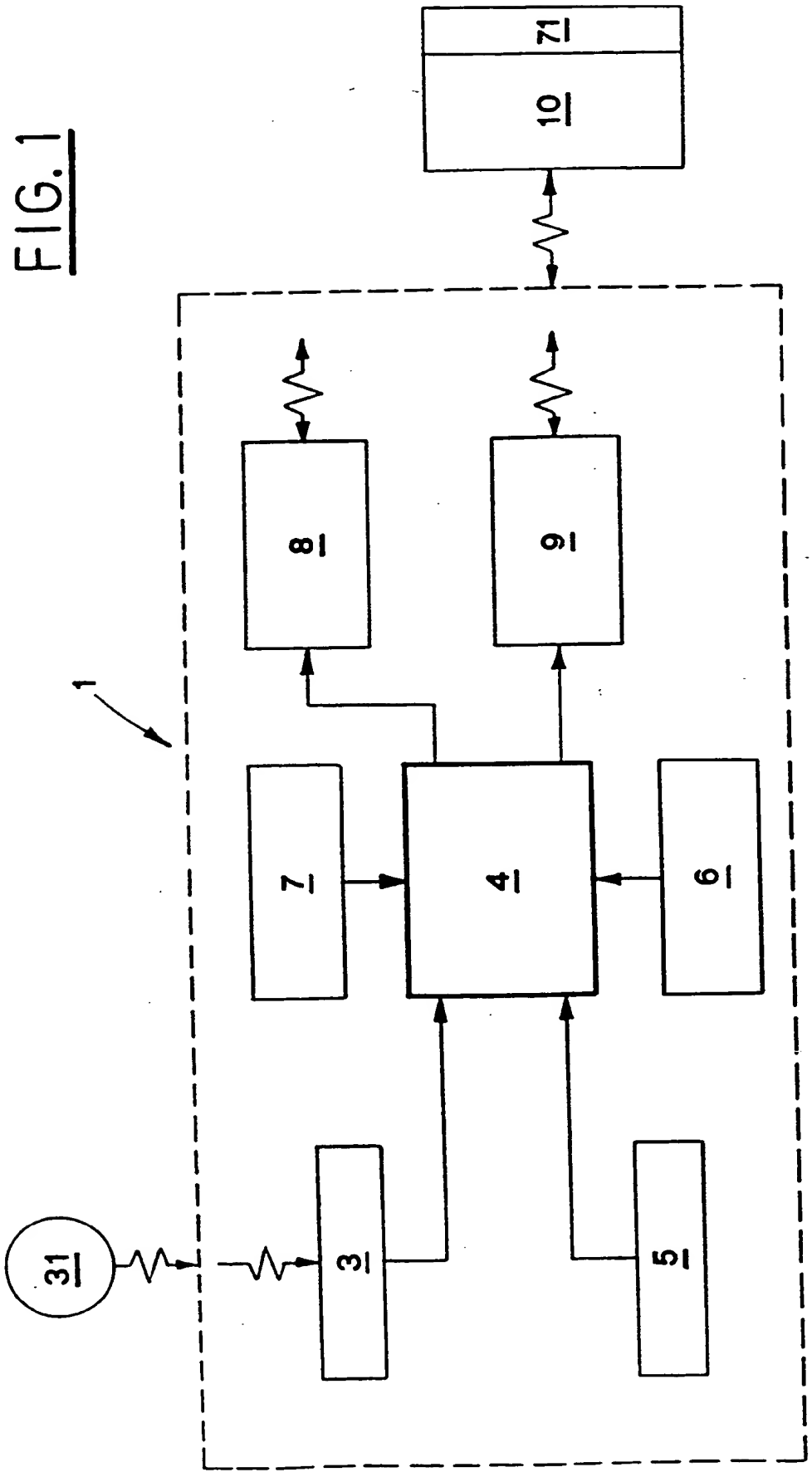
- an eighth antenna (11b) connected with the said second transmitter-receiver radio (11);
- an antenna switching circuit (54) adapted to switch continuously from the said third antenna (11a) to the said eighth antenna (11b).

32. Antitheft system, according to claim 1 or claim 2 and claim 26 and 31, characterised in that it comprises also antenna sensor (53) adapted to detect possible voluntary breakdown of the said antennas first (3a), second (8a), third (9a), fourth (3b), fifth (8b), sixth (9b), seventh (11a), and eighth (11b).

33. Antitheft system, according to claim 1 or claim 2, characterised in that it comprises also a display means (80), placed in the driving cab (35) of the said motor vehicle (2), provided with an acoustic device and adapted to display the information of the electronic unit (4) to which it is connected.

34. Antitheft system, according to claim 1 or claim 2, characterised in that a strengthening and protection structure (14), having an opening (15) in correspondence with the said localisation information detector (3), is fixed to the internal walls of said box-shaped casing (12).

FIG. 1



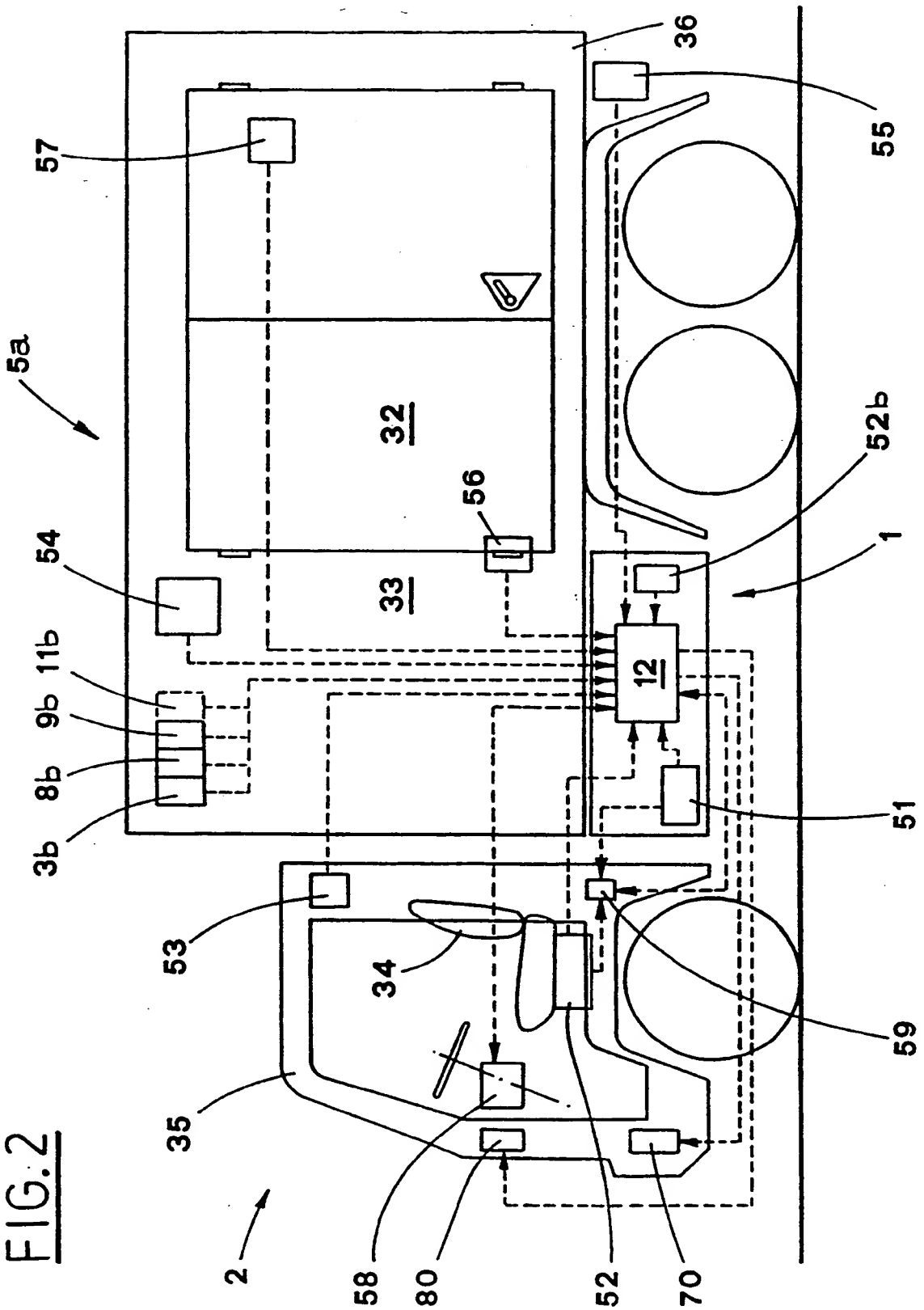


FIG.2

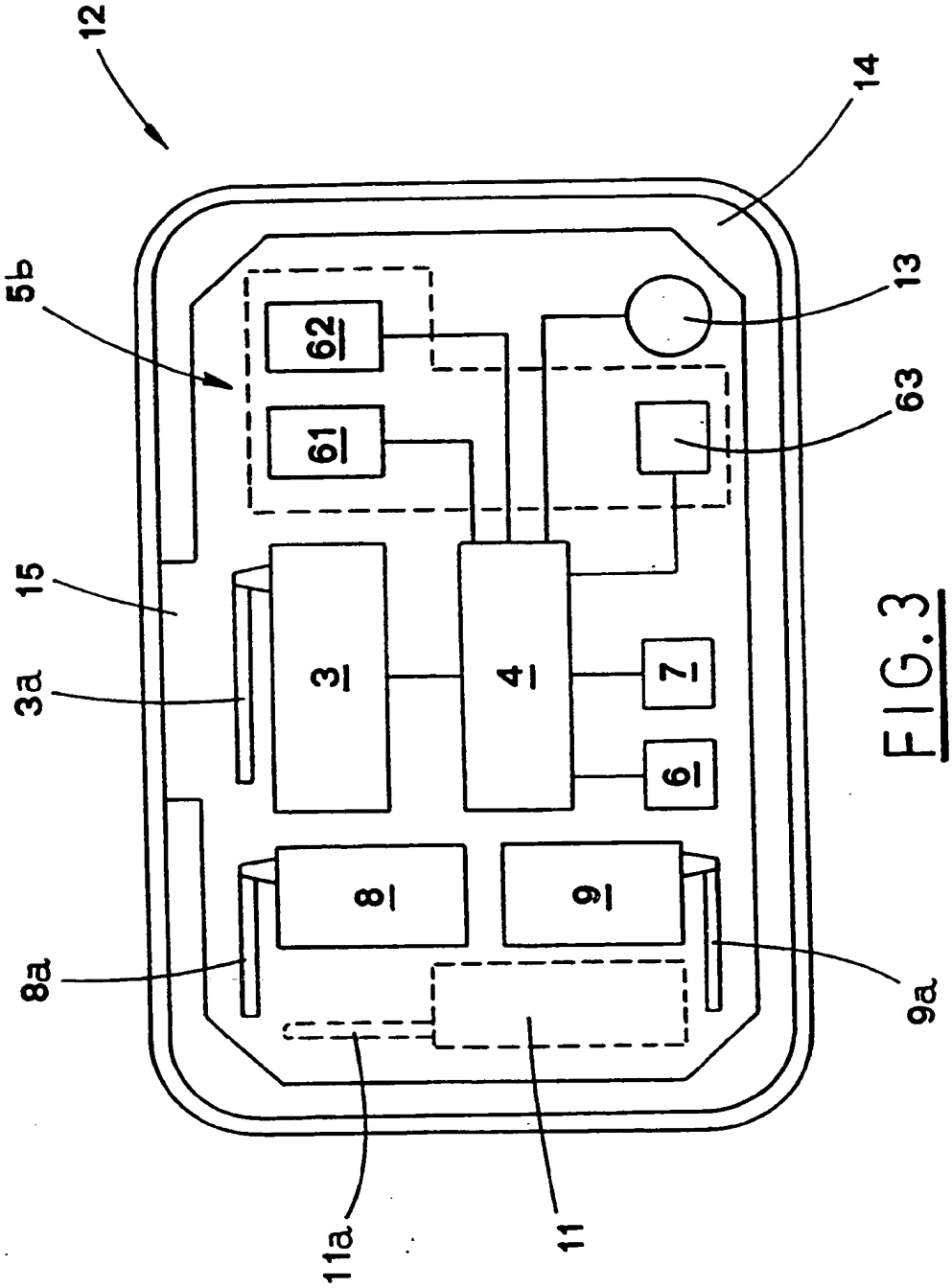


FIG.3

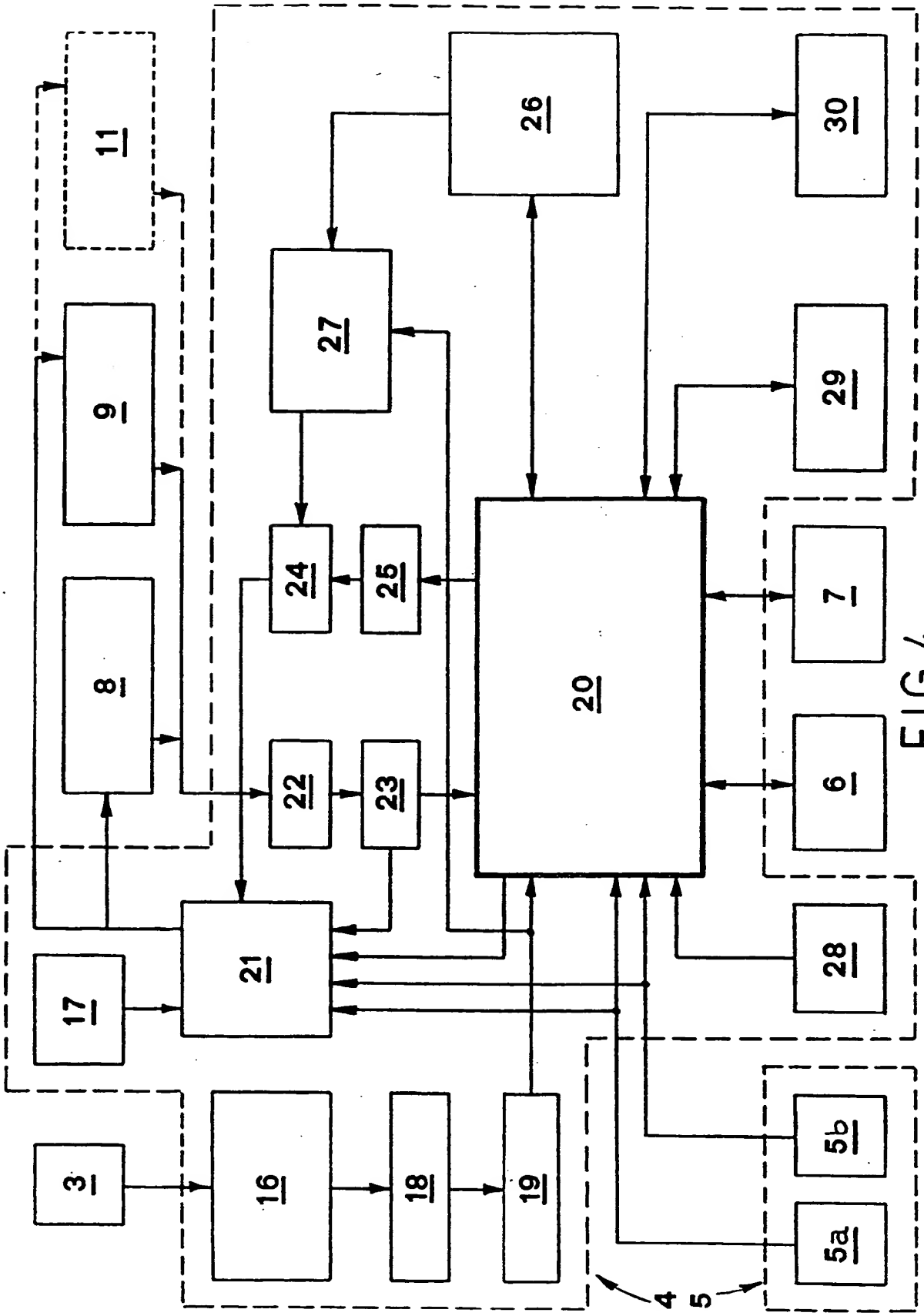


FIG.4

INTERNATIONAL SEARCH REPORT

Interr al Application No
PCT/IT 94/00058

A. CLASSIFICATION OF SUBJECT MATTER
IPC 5 B60R25/10 G08G1/127

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 5 B60R G08G

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X Y	EP,A,0 242 099 (ADVANCED STRATEGIES) 21 October 1987 see page 3, line 34 - page 5, line 35; figures 1,2	1,5,10, 12,21,33 2
Y A	US,A,4 651 157 (DONALD R. GRAY ET AL.) 17 March 1987 see column 6, line 24 - column 7, line 34; figure 1	2 29
P,X	WO,A,93 16452 (SIMMS INDUSTRIES) 19 August 1993 see page 5, line 7 - page 14, line 28; figure 1	1,5,21

-/--

[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
9 August 1994	29. 08. 94

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+ 31-70) 340-2040, Tx. 31 651 epo nl, Fax (+ 31-70) 340-3016	Waldorff, U

Form PCT/ISA/210 (second sheet) (July 1992)

INTERNATIONAL SEARCH REPORT

Inter. nal Application No
PCT/IT 94/00058

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO,A,93 05490 (ERICH MATOUSCHEK ET AL.) 18 March 1993 see page 8, line 13 - page 17, line 18; figure 1	2,3,19
A	US,A,5 027 104 (DONALD R. REID) 25 June 1991 see the whole document	2,23-25
A	WO,A,90 03899 (ROBERT BOSCH) 19 April 1990 see page 5, line 13 - page 8, line 28; figures 1,2	1,2,15, 20
A	US,A,4 940 964 (VICTOR DAO) 10 July 1990 see abstract	1,2,20, 23-25
A	EP,A,0 350 325 (GOULDITAR NO.18) 10 January 1990 see column 3, line 46 - line 58; figures 3,7	1,2,10

Form PCT/ISA/210 (continuation of second sheet) (July 1992)

INTERNATIONAL SEARCH REPORT

Information on patent family members

Inte ional Application No
PCT/IT 94/00058

Patent document cited in search report	Publication date	Patent family member(s)		Publication date
EP-A-0242099	21-10-87	CA-A-	1277400	04-12-90
		JP-A-	63024395	01-02-88
US-A-4651157	17-03-87	NONE		
WO-A-9316452	19-08-93	NONE		
WO-A-9305490	18-03-93	DE-A-	4203865	04-03-93
		DE-A-	4221585	13-01-94
		DE-A-	4224536	27-01-94
		EP-A-	0555437	18-08-93
US-A-5027104	25-06-91	NONE		
WO-A-9003899	19-04-90	DE-A,C	3839959	12-04-90
US-A-4940964	10-07-90	NONE		
EP-A-0350325	10-01-90	AU-A-	3795789	11-01-90